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ABSTRACT:

A corotron assembly includes insulating end blocks (10) to which the corotron wire (12) is anchored at (18). The end blocks have a chamber (14) through which the corotron wire passes and is located by reference surfaces (22, 23, 24), the chamber being closable by a lid (15). A resilient material (28) in the chamber is urged into engagement with the wire, being held in compression by the lid. The resilient material (28) is in the form of a slab which is bent into a U-shape so that the ends of the "U" contact the wire.

This damps vibrations in the corotron wire and prevents the arcing between the
wire (12) and the corotron shield (11) which would be likely to occur on
vibration of the wire. <IMAGE>

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(54) Corotron assembly

(57) A corotron assembly includes insulating end blocks (10) to which the corotron wire (12) is anchored at (18). The end blocks have a chamber (14) through which the corotron wire passes and is located by reference surfaces (22, 23, 24), the chamber being closable by a lid (15). A resilient material (28) in the chamber is urged into engagement with the wire, being held in compression by the lid. The resilient material (28) is in the form of a slab which is bent into a U-shape so that the ends of the "U" contact the wire. This damps vibrations in the corotron wire and prevents the arcing between the wire (12) and the corotron shield (11) which would be likely to occur on vibration of the wire.

Fig. 2

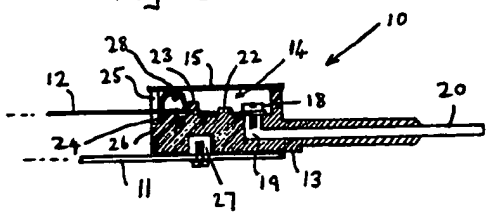

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Fig. 1

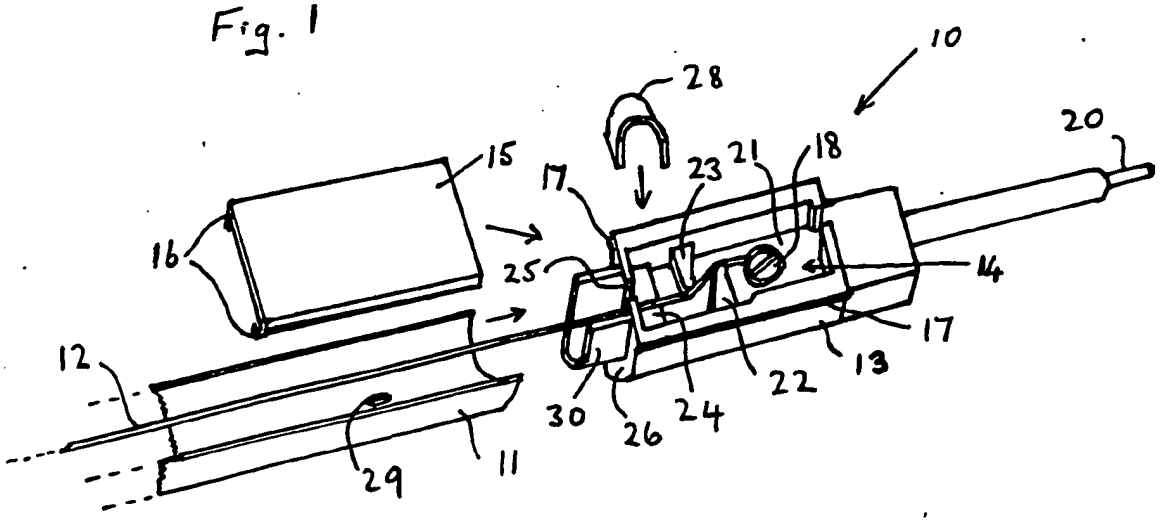
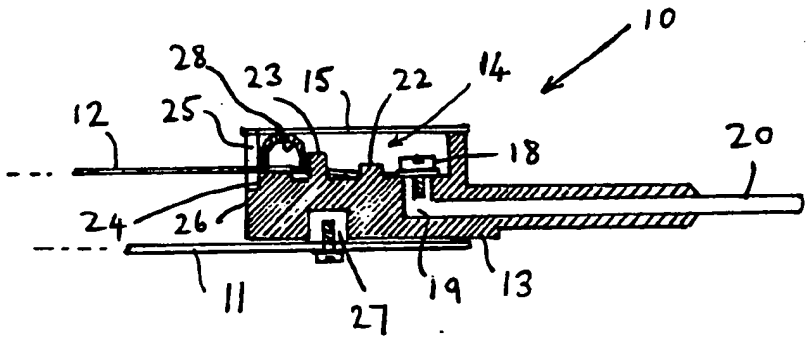


Fig. 2



SPECIFICATION

Corotron assembly

This invention relates to a corotron assembly, particularly, although not exclusively, useful for an electrophotographic copying machine. The corotron assembly is of the kind which includes at least one electrically insulating end block comprising means for anchoring an end of a corotron wire thereto, and a reference surface for supporting and locating the wire, the reference surface being within a chamber closable by removable lid means.

A corotron assembly typically comprises a corotron wire mounted so as to extend in the axial direction within a semi-cylindrical shield. Electrically insulating end blocks are secured to the ends of the shield, and have wire clamps for supporting the corotron wire, under slight tension, within the shield. The wire clamps are typically of a conductive material, one of them being connected by way of a suitable connector to a high voltage supply which applies the required potential difference between the wire and the shield to create a corona discharge. In a xerographic copying machine, such a corotron assembly is mounted with the open side of the shield closely adjacent the surface of the photoreceptor so as to apply electrical charges to the photoreceptor.

The end block is used to accurately position the corotron wire relative to the shield and the surface to which charges to be applied, and to this end may include reference surfaces over which the tensioned wire runs so that it is held in the required position in the two directions parallel with and perpendicular to the plane of the surface to which charges are to be applied. These reference surfaces are usefully formed as integral parts of the end block, between the clamping point and the point where the wire leaves the end block.

One form of corotron assembly including the features just discussed is to be found in the Xerox 1045 (Trade Mark) copier, the clamping device, in the form of a clamping screw, and the reference surfaces being contained within a hollow chamber formed in the end block, the open face of the chamber being closable by a slidable lid.

A problem encountered with corotron assemblies is that the corotron wire, being held under tension between reference surfaces, tends to vibrate in response to, for example, the application of an electrical potential to it, or the vibrations of neighbouring parts of the machine. Such vibration of the wire, particularly if it is in the fundamental mode, produces a substantial lateral movement of the wire at the anti-node position in the middle of the wire. In extreme cases, the wire may approach sufficiently closely to the shield to cause arcing, with consequent strain or damage to the power supply, or disruption of the electrostatic charge pattern on the photoreceptor.

Various techniques have been used to alleviate this vibration problem by damping the oscillations of the wire. One way of damping these vibrations is disclosed in UK patent application no. 1547935, in which the corotron wire extends over a wedge insert which also acts as a reference surface. The problem with such an arrangement is that if the material of the wedge is sufficiently rigid to act as an accurate reference surface, it will probably not be a good vibration damper. A more resilient material, better suited to damping vibrations, will not form an accurate reference surface.

Another known form of vibration damper comprises a block of resilient material such as an elastomeric material, which has in it a slit to accommodate the wire, the block being hung over, or fitted to, the wire in a suitable position within a chamber in the end block. A difficulty with such an arrangement is that an accurately dimensioned block with a slit in it has to be cut from a resilient material. The production of such a block from a resilient material is by no means easy.

The present invention is intended to provide a corotron assembly in which these difficulties are overcome, and provides an assembly of the kind specified which is characterised by a resilient material of such dimensions as to fit in the chamber in the end block, and to be resiliently urged by said lid means when closed into contact with at least one portion of the wire.

In a preferred embodiment, a rectangular piece of elastomeric material is bent into a U-shape within the chamber and pressed into place against the wire by the lid.

The assembly of the invention has the advantage that a non-critically dimensioned piece of elastomeric material can be used as a very efficient vibration damper for the corotron wire, as well as providing a seal against the ingress of contaminants into the chamber.

A corotron assembly in accordance with the invention will now be described by way of example, with reference to the accompanying drawings, in which:—

Figure 1 is an exploded perspective view of one end of the corotron assembly; and

Figure 2 is a cross-sectional side view of the end block of the assembly shown in Figure 1.

Referring to Figure 1, a corotron assembly comprises a first end block 10, a second end block (not shown) a corotron shield 11, and a corotron wire 12. The end block 10, which has an electrical connector 20 projecting from its outer end, is secured at one end of the shield 11, the second end block being secured at the other end of the shield, and being similar to the end block 10 except that it does not have an electrical connector. The wire 12 extends within the shield, between the inner faces of the two end blocks. Although the shield shown is of generally half-cylindrical cross section, any other suitable shape, such as an open rectangular section, may be used. In the form shown, the base portion 13 of the end block is shaped to fit inside the end portion of the shield 11, the end-block being secured to the shield by means of a screw which passes through a hole 29 in shield 11 and engages a threaded boss 27 secured in the base portion 13. A chamber 14 is formed in the end block 10, being of generally rectangular cross section, and being closable by a lid 15 which slides into place over the chamber 14. For this purpose, the lid 15 is provided with lipped extensions 16 that are arranged to engage over outward extensions 17 of the longitudinal edges of the open face of the chamber 14. A U-shaped

extension 30 is formed on the inner face of the end block 10 in order to increase the path length of the surface of the end block between the wire 12 and shield 11, thereby reducing the incidence of tracking.

The corotron wire 12 is secured to the end block 10 by means of a clamping screw 18 which is screwed into a metal connector assembly 19 which is arranged at one end to receive the screw 18, and which at its other end extends out of the end block to provide the connector 20 for an electrical supply (not shown) to the corotron. The clamping screw 18 is located in the floor 21 of the chamber 14, towards the outer part of the end block 10. The corotron wire passes around two deflector portions 22, 23 which are moulded with the end block assembly, and stand up from the floor 21. The deflector 22 nearest the clamping screw 18 simply serves to maintain the wire in contact with the second deflector 23, the second deflector 23 forming a reference surface for accurately positioning the corotron wire laterally of the assembly. The wire then passes over a step portion 24, also standing up from the floor 21, the step 24 acting as a reference surface for accurately positioning the corotron wire in the direction towards and away from the surface to which charges are to be applied. Other forms of reference surface may be used, such as a ridge or lip instead of the step 24. In use of the corotron assembly, it is positioned with the open face of the corotron shield spaced closely adjacent the surface to which charges are to be applied. A slot 25 in the end wall 26 of the chamber 14 allows the corotron wire to pass from the inner face of the end block 10 and along the shield 11 to the second end block at the other end of the shield 11. The assembly is secured in place in, for example, a xerographic copying machine by any suitable means such as spring clips which engage the shield 11.

In order to damp down vibrations in the wire, a piece of resilient material is placed within the chamber 14, in the compartment formed between the deflector 23 and the end wall 26 of chamber 14. The resilient material may be for example, in the form of a block of rectangular cross section which will fit into the compartment, but needs to be compressed between the lid and the floor 21 of chamber 14 when the lid is in place. The dimensions of such a block are non-critical, provided that the block contacts the wire, and is held in compression against the wire by the lid. In a preferred embodiment, as shown in the drawings, a rectangular slab 28 of an elastomeric material is bent into a U-shaped configuration and placed in the compartment between deflector 23 and end wall 26. As depicted in Figure 2, the slab 28 is placed such that the ends of the "U" contact the wire 12, the slab 28 being long enough that it needs to be compressed into the compartment in order to slide the lid 15 into place. In this way, the resilient material of the slab 28 is urged into contact with the wire 12, thereby preventing vibrations. As can be seen, the dimensions of the slab 28 are relatively non-critical, provided that the slab is long enough (around the "U") that it needs to be held in compression by the lid 15. A suitable material for the slab 28 is a micro-cellular urethane (e.g. Poron trade mark) which provides good vibration absorption characteristics. In addition, the slab 28 is pressed against the end wall 26, sealing the slot 25 and preventing the ingress of contaminants, such as toner particles, into the chamber 14.

The invention provides an inexpensive and easily fitted vibration absorber, substantially overcoming the problem of arcing due to corotron wire vibration.

CLAIMS

1. A corotron assembly including at least one electrically insulating end block comprising means for anchoring an end of a corotron wire thereto, and a reference surface for supporting and locating the wire,

the reference surface being within a chamber closable by removable lid means, characterised by resilient material of such dimensions as to fit in said chamber and to be resiliently urged by said lid means when closed into contact with at least one portion of said wire.

2. A corotron assembly according to claim 1 wherein said resilient material comprises a generally rectangular slab which is bent into U-shaped configuration within said chamber and held by the lid with its two end urged into contact with the wire.

3. A corotron assembly according to claim 1 or claim 2 wherein said resilient material comprises a micro-cellular urethane.

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